

**STATE OF MINNESOTA
PUBLIC UTILITIES COMMISSION**

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Chair
Commissioner
Commissioner
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In the Matter of the Application of
Wisconsin Power and Light Company
for a Site Permit for a 400-Megawatt
Large Wind Energy Conversion
System and Associated Facilities in
Freeborn County

ISSUE DATE:

DOCKET NO.

ET6657/WS-08-573

**FINDINGS OF FACT, CONCLUSIONS
OF LAW AND ORDER, ISSUING A
SITE PERMIT TO WISCONSIN
POWER AND LIGHT COMPANY ,
FOR THE BENT TREE WIND
PROJECT**

The above-entitled matter came before the Minnesota Public Utilities Commission (Commission) pursuant to an application submitted by Wisconsin Power and Light Company (WPL) for a site permit to construct, operate, maintain and manage a 400-Megawatt (MW) nameplate capacity Large Wind Energy Conversion System (LWECS) to be built in two phases and associated facilities in Freeborn County.

All of the proposed wind turbines and associated facilities will be located in Freeborn County. Associated facilities will include pad mounted step-up transformers for each wind turbine, access roads, an electrical collection and feeder system, project substation, and up to two permanent meteorological towers. The energy from the proposed 400 MW project will be delivered from the project substation to the electrical grid at the existing Hayward ITC-Midwest substation located east of Albert Lea.

STATEMENT OF ISSUE

Should Wisconsin Power and Light Company (WPL) be granted a site permit under Minnesota Statutes section 216F.04 to construct a 400 MW Large Wind Energy Conversion System in Freeborn County?

Based upon the record created in this proceeding, the Public Utilities Commission makes the following:

FINDINGS OF FACT

Background and Procedure

1. On June 20, 2008, WPL filed an application with the Public Utilities Commission for up to 400 megawatts of nameplate wind power generating capacity, to be built in two 200 MW phases, identified as the Bent Tree Wind Project in Freeborn County. On August 22, 2008, WPL filed a revised LWECS site permit application. (Hearing Exhibit “HE” 6).
2. Office of Energy Security (OES) Energy Facility Permitting (EFP) staff reviewed and determined that the August 22, 2008, application complied with the application requirements of Minnesota Rules, part 7854.0500. In its comments and recommendations to the Commission, dated September 11, 2008, OES EFP staff recommended that the Commission accept the application and issue a draft site permit (OES Exhibit 1).
3. On September 16, 2008, a Commission Order accepted the application for the Bent Tree Wind Project and associated facilities and also issued a draft site permit for review and comment (OES Exhibit 2).
4. On October 2, 2008, OES EFP staff issued a “Notice of Application Acceptance, Public Information and Scoping Meeting” to receive comments on the permit application, the draft site permit, and the scope of the environmental report for the certificate of need proceeding. (OES Exhibit 3).
5. On October 2, 2008, WPL distributed copies of the “Site Permit Application for the Bent Tree Wind Facility, Draft Site Permit and Notice of Application Acceptance, Public Information and Scoping Meeting” to government agencies and residences. (OES Exhibit 5)
6. Published notice of site permit application acceptance, the OES public information and scoping meeting and opportunity to comment on the permit application and the draft site permit appeared in the Alden Advance, on October 9, 2009, and The Albert Lea Tribune, on October 10, 2009. (OES Exhibit 4). The published notice provided: a) location and date of the public information meeting(s); b) description of the proposed project; c) deadline for public comments on the application and draft site permit; d) description of the Commission site permit review process; and e) identification of the public advisor. The notice published meets the requirements of Minnesota Rules, Part 7854. 0900 subp2.
7. On October 6, 2008, OES EFP staff published in the EQB Monitor notice of the October 21, 2008, application acceptance, public information meeting, and opportunity to comment on the permit application and the draft site permit, Volume 32, No. 20, October 6, 2008. (Exhibit 6, pages 9-13). The published notice contained all of the information required by Minnesota Rules part 7836.0900 subp. 1. Notice also appeared on the Commission web site on October 3, 2008.

8. The OES EFP staff held two public information meetings on October 21, 2008, (in Albert Lea at the Freeborn County Government Center in the afternoon, and at the Hartland Community Center in the evening meeting) to provide an overview of the Commission permitting process and to receive comments on the site permit application, draft site permit and scope of the environmental report. Approximately 70 people attended the two meetings. Representatives from the WPL were also present as was a representative of the Commission. OES EFP staff provided an overview of Certificate of Need (CON) and LWECS site permitting processes and responded to questions. OES EFP staff and WPL responded to project specific questions and general questions about wind energy. Questions were asked about the need for the project, transmission requirements, project timing, project phasing, taxes and avian impacts. There were general site permit questions, but nothing specific regarding setbacks in the draft site permit. Following the public meetings, OES staff received several calls and questions from people who attended the meeting and from people who wanted to attend but were unable to do so. The deadline for submitting comments on the site permit application, draft site permit and alternatives (scoping comments) to be included in the Environmental Report was December 3, 2008.
9. Twenty-eight written comments were received, including 25 in a form letter format. These letters questioned the adequacy of residential setbacks, requested a set back of one mile from non-participating landowner's property lines and requested, if necessary, a contested case hearing for the presentation of documents substantiating their request. The three other comment letters were from two state agencies (Department of Natural Resources and Minnesota Department of Transportation) and the applicant. The December 3, 2008, letter from the Minnesota Department of Natural Resource and the October 20, 2008, letter from the Minnesota Department of Transportation did not raise any questions or issues. (OES Exhibit 7).
10. On March 19, 2009, the request for a contested case hearing came before the Commission. (OES Exhibit 8). On March 24, 2009, a Commission Order denied the request for a contested case hearing; but "ordered a public hearing to include issues relating to the siting and permitting, following the release of the Minnesota Department of Health's report on the health effects of wind turbines." (OES Exhibit 9). The Order noted that the public hearing could be held in conjunction with the public hearing for the Certificate of Need proceeding (Docket No. IP-6657/CN-07-1425) for the Bent Tree Wind Project Phase I.
11. On June 18, 2009, the Commission issued Notice of the June 29, 2009, Public Hearing in Albert Lea. The notice was published in Freeborn County in *The Albert Lea Tribune* on June 19, 2009, and in *The Alden Advance* on June 25, 2009. (OES Exhibits 10 & 11 and HE 15).
12. On June 29, 2009, a public hearing was held in Albert Lea, Minnesota, to receive public testimony on need and siting matters. Public comments and exhibits were recorded and entered into the record, with additional comments allowed to be submitted on or before July 14, 2009.

13. Administrative Law Judge (ALJ) Steve M. Mihalchick presided over the public hearing the afternoon and evening on June 29, 2009. The ALJ's Summary of Public Testimony was submitted to the PUC on August 25, 2009. (OES Exhibit 13).

Permittee

14. Wisconsin Power and Light Company (WPL) filed a site permit application for the proposed 400 megawatt (MW) Bent Tree Wind Project Phase I and II in Freeborn County. WPL is proposing to build the Project in two 200 MW phases "Bent Tree Wind Project Phase I and Phase II." WPL is an affiliate of Alliant Energy, and is a regulated, investor owned utility serving customers in portions of the state of Wisconsin. WPL will own and operate the Bent Tree Wind Project. Energy generated from the Project will be used to meet WPL's renewable portfolio standards requirements pursuant to Wisconsin statute and to meet the energy demand of WPL's retail and wholesale customers. Energy will be delivered into the Midwest Independent Transmission System Operator (MISO) grid and used within the MISO footprint area.

Project Description

15. Phase I comprised of 201.3 MW of the 400 MW Bent Tree Wind Project will consist of up to 122 Vestas V82 1.65 MW wind turbine generators mounted on freestanding tubular towers and associated facilities. A turbine model for the Bent Tree Project Phase II has not been selected at this time.
16. The towers will be 80 to 100 meters in (262 to 328 feet) in height. The blades on the Vestas V82 1.65 MW wind turbine are approximately 40 meters (133 feet) long. Turbine rotor diameter for the Vestas V82 will be 82 meters (269 feet) across. The overall height of the tower, nacelle and blade will be approximately 118.5 meters (397 feet) when one blade is in the vertical position. The rotor swept area is 5,281 meters squared (56,844 square feet). The rotor speed will be about 14.4 revolutions per minute corresponding to a maximum rotor tip speed of 138 miles per hour.
17. The project will also include an underground automated supervisory control and data acquisition system (SCADA) for communication purposes. Up to two permanent meteorological towers will be used as part of the communication system. Other components of the project include a concrete and steel foundation for each tower, pad-mounted step-up transformers, all weather class 5 roads of gravel or similar material, and an underground energy collection system and a project substation. A separate 161 kV transmission line approximately 18 miles in length will connect the Project substation to the ITC owned Hayward Substation located east of Albert Lea. The 161 kV transmission line is being permitted by Freeborn County.
18. The Vestas V82 1.65 MW wind turbine is a three bladed, upwind, active yaw, and active aerodynamic control regulated wind turbine with power/torque control capabilities. The rotor utilizes blade pitch regulation and variable speed operation to achieve optimum power output at all wind speeds. The variable speed operation minimizes power and torque spike delivered from the rotor to the drive train resulting in improved long-term

reliability. Each turbine is equipped with a wind direction sensor. The wind direction sensor communicates with the computer system, which evaluates the measured wind parameters, and within a specified time interval, activates the yaw drives to align the nacelle to the wind direction.

19. Each turbine is interconnected through an underground electrical collection system at 34.5 kV. The feeder lines from the project collection system feed the power to the independent breaker positions at the proposed project substation. The project substation steps up the voltage from the 34.5 kV collection systems to the transmission system level. All of the proposed feeder lines would connect to the proposed project substation within the site permit boundaries.
20. The blades are made of fiberglass with a smooth layer of gel coat that provides ultraviolet protection. The blades will be either white or grey in color. The blades will be equipped with lightning protection. The entire turbine is also grounded and shielded to protect against lightning.
21. Each tower will be secured by a concrete foundation that will vary in size depending on the soil conditions. A control panel that houses communication and electronic circuitry is placed in each tower. In addition, a step-up, pad-mounted transformer is necessary for each turbine to collect the power from the turbine and transfer it to a 34.5 kV collection system via underground cables.
22. All turbines and up to 2 permanent meteorological towers will be interconnected with fiber optic communication cable that will be installed underground. The communication cables will run back to a central host computer which will be located either at the project substation or at the operations and maintenance facility where a supervisory control and data acquisition (SCADA) system will be located. Signals from the current and potential transformers at each of the delivery points will also be fed to the central SCADA host computer. The SCADA system will be able to give status indications of the individual wind turbines and the substation and allow for remote control of the wind turbines locally or from a remote computer. This computerized supervisory control and data acquisition network will provide detailed operating and performance information for each wind turbine. The Permittee will maintain a computer program and database for tracking each wind turbine's maintenance history and energy production.
23. Housed inside the fiberglass nacelle that sits on the top of the tower are the generator, brake system, yaw drive system and other miscellaneous components.

Site Location and Characteristics

24. The 400 MW Bent Tree Wind Project, will be located in northwest Freeborn County, approximately four miles northwest of Albert Lea. The Project site includes portions of Hartland, Manchester, Bath and Bancroft townships. These townships are zoned agricultural, except for incorporated towns in Hartland and Manchester. The topography within the site varies from flat to rolling and undulating. Elevation varies from 1,250 to 1,320 feet above mean sea level. The dominant land use is agricultural, comprised of

corn and soybeans. Alfalfa, small grains and pasture are other crops located within the site permit boundary. There are also numerous woodlots and windbreaks within the proposed site boundaries. The Project boundary encompasses approximately 32,500 acres.

25. Construction of the turbines sites and access roads will involve temporarily disturbing at the most approximately five to ten acres of land per turbine or approximately 600 to 1,200 acres for each phase of the Project for contractor staging areas, foundation construction, underground power lines, and tower and turbine assembly. Permanent roads are expected to be about 16 feet wide. The permanent displacement for turbine access roads and for towers and transformers and areas around them is about 180 acres for each phase of the Bent Tree Wind Project.
26. Wind turbine and road access will be sited to take into account the contours of the land and prime farmland locations to minimize impact. The Project will be subject to the requirements of the National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) Construction Stormwater Permit. An erosion and sediment control plan and Storm Water Pollution Prevention Plan (SWPPP) will also be prepared for the Project and the disturbed areas will be seeded after construction to stabilize the area.
27. According to WPL's application, the highest elevations in the site is about 1,320 feet. Slopes in this area commonly range from nearly level to gently rolling.

Wind Resource Considerations

28. WindLogics estimates that the 80 meter wind speeds in the Project Area average from 7.7 to 8.1 meters per second (mean average annual). Wind speeds are generally greater in the night and early morning hours and decline at midday. Regionally, the prevailing wind directions are generally southeast and northwest. Of the annual energy budget, a higher percentage results from southerly winds, which are most frequent in the warmer weather months. The north and northwest winds typically occur in winter.
29. For this project, turbines will be sited in strings and clusters along hilltops and ridgelines within the site boundaries. The wind turbines are sited so as to have good exposure to winds from all directions with emphasis on exposure to the prevailing southerly and northwesterly wind directions. The turbine spacing, according to WPL's application, maximizes use of the available wind and minimizes wake and array losses within the topographical context of the site. The turbines are typically oriented west-southwest to north-northeast, which is roughly perpendicular to the prevailing southerly and northwest winds. Turbine placement, aside from other resource features where setbacks or wind access buffers are required, will be designed to provide sufficient spacing between the turbines to minimize internal wake losses. Given the prevalence for southerly and northerly winds, the spacing is widest in the north-south direction. Greater or lesser spacing between the turbines or turbine strings may be used in areas where the terrain dictates the spacing. This is addressed in the permit at III.E.5. Individual, isolated

turbine sites may be necessary to minimize Project impacts. Sufficient spacing between the turbines is utilized to minimize wake losses when the winds are blowing parallel to the turbines.

30. Assuming net capacity factors of 37 to 39 percent, projected average annual output will range from approximately 1,296,500 MWh to 1,366,600 MWh per year. The net annual energy output per turbine is estimated to be approximately 5,357 to 5,647 MWh (megawatt hours) per year. The base energy calculation presented assumes a normal or average wind year. The maximum variation in energy is within +/- 15 percent. Based on the data, one would expect the annual variation in energy at the project site to be within 10 percent of the mean during most years.

Land Rights and Easement Agreements

31. In order to build a wind plant, a developer needs to secure site leases and easement option agreements to ensure access to the site for construction and operation of a proposed project. These lease or easement agreements also prohibit landowners from any activities that might interfere with the execution of the proposed project.
32. WPL has obtained lease and easement option agreements and/or rights to such agreements with landowners for land within the project site boundary necessary for installation of the components of the wind farm. These rights and easements will be used to site the turbines and all associated facilities and provide the necessary wind access buffers and setbacks.
33. WPL has options, leases or easement on the land and wind rights necessary within the site to build the Project. The Phase I, portion of the Bent Tree Wind Project contains 294 parcels of land and owners of 195 parcels are Project participants. The Phase II, portion of the Bent Tree Wind Project contains 168 parcel of land and owners of 118 parcels are Project participants. In total there are 462 parcels of land in the Project and owners of 313 are Project participants. However, additional wind rights and buffers may need to be obtained to comply with draft site permit setback requirements. Land and wind rights will need to encompass the proposed wind farm and all associated facilities, including but not limited to wind and buffer easements, wind turbines, access roads, meteorological towers, electrical collection system and electric lines located on or along public road rights-of-way.

Site Criteria

34. Minnesota Rules chapter 7854 applies to the siting of Large Wind Energy Conversion Systems. The rules require an applicant to provide a substantial amount of information to allow the PUC to determine the potential environmental and human impacts of the proposed project and whether the project is compatible with environmental preservation, sustainable development, and the efficient use of resources. Minn. Rules Parts 7854.0500 through 7854.0600. The following analysis addresses the relevant criteria that are to be applied to a LWECS project.

Human Settlement, Public Health and Safety

35. The site is in an area of relatively low population density, characteristic of rural areas throughout southeastern Minnesota. WPL has established a minimum setback of 1,000 feet to any resident, irrespective of whether that landowner is a participating or a non-participating landowner. WPL will also be required to set back its turbines a minimum of five rotor diameters (1,345 feet) on the prevailing wind axis from non-participating landowners' property lines and three rotor diameters on the non-prevailing wind axis. (H.E. 28, page 7). Wind turbines will not be located within the boundaries of cities of Hartland or Manchester. WPL's proposed project design will comply with the Minnesota Pollution Control Agency (PCA) noise standards. As a result, the impact of the proposed LWECS on human settlement, public health and safety will be minimal. The site permit, at part III.C has conditions for setbacks from residences and roads. The proposed wind turbine layout will meet or exceed those requirements. The proposed project is not expected to affect any water wells (used, unused or unsealed) or any rural water system that services the area.
36. There will be no displacement of existing residences or structures in siting the wind turbines and associated facilities.
37. WPL has worked with the city of Albert Lea, Albert Lea Municipal Airport and the Federal Aviation Administration (FAA) to identify and address any potential air hazards that may be created by the Project. As a result, the FAA issued a "No-Hazard Determination" for this Project. (HE 6, Appendix E-2). The project will comply with the Federal Aviation Administration requirements with respect to lighting. See site permit condition III.E.4.
38. The Permittee will provide security during construction and operation of the project, including fencing, warning signs, and locks on equipment and facilities. The Permittee will also provide landowners and interested persons with safety information about the project and its facilities. See site permit condition III.B.15.
40. In winter months ice may accumulate on the wind turbine blades when the turbines are stopped or operating very slowly. Furthermore, the anemometer may ice up at the same time, causing the turbine to shut down during any icing event. As weather conditions change, any ice will normally drop off the blades in relatively small pieces before the turbines resume operation. This is due to flexing of the blades and the blades' smooth surface. Although turbine icing is an infrequent event, it remains important that the turbines are not sited in areas where regular human activity is expected below the turbines during the winter months.
41. Each turbine will be clearly labeled to identify each unit and a map of the site with the labeling system will be provided to local authorities as part of the fire protection plan. See permit condition III.B.17.

Noise

42. Background noise levels in the Project Area are typical of those in a rural setting, where existing nighttime noise levels are commonly in the low to mid-30 dBA. The dBA scale represents A-weighted decibels based on the range of human hearing. Higher levels exist near roads and other areas of human activity. Wind conditions in the Project Area tend to increase ambient noise levels compared to other rural areas. An assessment of noise levels at residences (i.e. receivers) across the Project Area was performed (HE 6, Appendix A, Exhibit A-4). Noise levels were calculated using the Windfarmer program and a representative wind turbine for the site. The program assumes all turbines in the Project Area are operating simultaneously and winds speed of 8 m/s (17.9 mph) are occurring and represents the wind speed when maximum noise levels are expected.
43. Noise levels predicted by Windfarmer were compared to the Minnesota Pollution Control Agency Daytime and Nighttime L10 and L50 Limits as stated in Minn. Rule 7030.0040. These standards describe the limiting levels of sound established on the basis of present knowledge for the preservation of public health and welfare. These standards are consistent with speech, sleep, annoyance, and hearing conversation requirements for receivers within areas grouped according to land activities by the Noise Area Classification (NAC) system established in Minn. Rule. 7030.0050. The NAC-1 was chosen for receivers in the Project Area since this classification includes farm houses as household units. Daytime and nighttime limits for this classification are (1) L50 limit of 60 dBA and L10 limit of 65 dBA in daytime, and (2) L50 limit of 50 dBA and L10 limit of 55 dBA at nighttime. The nighttime L50 limit of 50 dBA is the most stringent limit.
44. Wind turbines, when in motion, do generate sound or noise. The level of sound (noise) varies with the speed of the turbine and the distance of the listener or receptor from the turbine. On relatively wind days, the turbines create more noise; however, the ambient or natural wind noise levels tend to override the turbine noise as distance from the turbine increases.
45. Noise impacts to nearby residents and other potentially affected parties will be factored into the turbine micrositing process. WPL must ensure compliance with PCA noise standards. See permit condition III.E.3.
46. During the comment period the public expressed numerous concerns about possible health effects of low frequency vibrations and sound from wind turbines. In late February 2009, OES requested a “white paper” from the Minnesota Department of Health (MDH) evaluating possible health effects associated with low frequency noise vibrations and sounds arising from large wind energy conversion system (LWECS). A commenter on another wind project, the Lakeswind Wind Power Plant, in Clay, Becker and Ottertail counties, also wrote to the Commissioner of MDH to ask for an evaluation of health issues related to exposure to low frequency sound energy generated by wind turbines. In March 2009, MDH agreed to evaluate health impacts from wind turbine noise and low frequency vibrations. The MDH released its “white paper” on the “Public Health Impacts

of Wind Turbines on May 22, 2009, and it was included as Appendix D in the Environmental Report submitted for the Certificate of Need (CON) proceeding for the Bent Tree Wind Project (Docket No. T-6657/CN-07-1425) (HE 4, Appendix D).

47. The summary of public testimony prepared by the ALJ captures the on-going concerns being expressed by some residents of the Project Area and their requests for turbine setbacks of one-half mile or more from homes.
48. In a letter to Mr. and Ms. Anderson, (OES Exhibit 12) dated August 13, 2009, MDH Commissioner, Sanne Magnan, M.D., Ph.D, responded to specific questions posed by Mr. Anderson as follows:

Are current standards in Minnesota safe? Regulatory standards protect health and safety, but whether for air, water or noise, regulators do not set “bright line” standards without also considering cost, technical difficulties, possible benefit and alternatives. No regulatory standard offers absolute safety. The Minnesota Department of Health can evaluate health impacts, but it is the purview of regulatory agencies to weigh these impacts against alternative and possible benefits.

Are the proponents of wind turbine syndrome mistaken? As noted in the “White Paper,” the evidence for wind turbine syndrome, a constellation of symptoms postulated as mediated by the vestibular system, is scant. Further, as also noted, there is evidence that the symptoms do not occur in the absence of perceived noise and vibration. The reported symptoms may or may not be caused by “discordant” stimulation of the vestibular system.

Does more study of adverse effects need to be undertaken? More study may answer questions about the actual prevalence of unpleasant symptoms and adverse effect under various conditions such as distance to wind turbines and distribution of economic benefit. However, there is at present enough information to determine the need for better assessment of wind turbine noise, especially at low frequencies. Such assessments will likely be beneficial for minimizing impacts when projects are sited and designed. Also, even without further research, there is evidence that community acceptance of projects, including agreement about compensation of within project areas, will result in fewer complaints. Therefore, more research would be useful, but the need will have to be balanced against other research needs.

49. WPL has evaluated both noise and shadow flicker during the planning stages of the Bent Tree Wind Project to make informed decisions about turbine placement. The site permit (III.F.2.) requires the Permittee to submit a proposal to the Commission for the conduct of a noise study.

Visual Values

50. The placement of up to 242 turbines for the Bent Tree Wind Project Phase I and II, will affect the appearance of the area. The wind turbines will be mounted on tubular towers that are between 262 and 328 feet tall. The rotor blades will have a diameter of 269 feet. The turbine towers and rotor blades will be prominent features on the landscape. There will be intermittent, expansive views of the turbines to passing motorists on highways I35, I90, State Highway 13 and local roads. Motorists and drivers on local township and county roads may travel within 300 feet of some turbines.
51. The visual impact of the wind turbines will be reduced by the use of a neutral paint color. The only lights will be those required by the Federal Aviation Administration. All site permits issued by the Commission require the use of tubular towers; therefore, the turbine towers will be uniform in appearance. Blades used in the proposed project will be white or grey. The wind turbines in this project, while prominent on the landscape, also blend in with the surrounding area. The project site will retain its rural character. The turbines and associated facilities necessary to harvest the wind for energy are not inconsistent with existing agricultural practices.
52. From one perspective, the proposed project might be perceived as a visual intrusion on the natural aesthetic value on the landscape, characterized by up to 242 tubular steel structures approximately 262 feet high, standing on formerly undisturbed high-ground, with 133 foot long blades, for an overall height of 398 feet or more when one blade is in the vertical position. Wind plants have their own aesthetic quality, distinguishing them from other non-agricultural uses. Existing wind plants have altered the landscape elsewhere in Minnesota from agricultural to wind plant/agricultural. This project will modify the visual character of the area. Because wind generation development is likely to continue in Freeborn County, this visual presence will continue to increase as wind development occurs. To date, the presence of the wind turbines in other parts of Minnesota has been well accepted by the people who live and work in those areas.
53. Visually, the Bent Tree Wind Project Phase I and II will be similar to other LWECS projects located on Buffalo Ridge and southeastern Minnesota.

Recreational Resources

54. Recreational opportunities in Freeborn County include hiking, biking, boating, fishing, camping, swimming, horseback riding, skiing, hunting, and nature viewing. The Manchester Wildlife Management Area (WMA) is the only WMA in close proximity to the Project site. Hunting is permitted in designated Minnesota Department of Natural Resources (MnDNR) WMAs, unless otherwise posted. WMAs are also managed to provide wildlife habitat and improve wildlife production. These MnDNR lands were acquired and developed primarily with hunting license fees. WMAs are closed to all-terrain vehicles and horses because of detrimental effects on wildlife habitat.
55. The Manchester WMA is located just inside the east-central boundary of the Project Area.

56. The turbines will be noticeable to persons using the Manchester WMA. Turbines will be at least five rotor diameters (RD) on the prevailing wind axis and at least 3 RD on the non-prevailing wind from WMAs or local parks. See permit condition III.C.4. Turbine operations are not expected to directly affect the natural areas in any material way and no adverse impact on wildlife management areas or practices is expected.

Public Services and Infrastructure

57. The primary transportation arteries through the project Area include State Highway 13 which runs north-south from the westerly portion of the Project Area through the south central portion. County roads 25, 29 and 35 also traverse the Project Area. One active railroad, the Chicago and Northwestern Rail Line, crosses through the western portion of the Project Area.
58. The Minnesota Department of Transportation (MnDOT) is upgrading the 911 system throughout state. MnDOT has finished its siting and permitting work in Freeborn County. Microwave beam path analysis work will avoid conflicts with the Fresnel zones. WPL will also place towers so as to avoid interfering with land mobile facilities. (HE 6, page 31).

The proposed project will have approximately 70 miles of underground cables for the collector lines on private property within the wind farm. The underground cables will be installed in a trench that is at least 48 inches in depth. Most of the underground electric circuits will parallel existing turbine maintenance roads or public road rights-of-way. However, some of these underground circuits will cross private rights-of-way. WPL's application indicates that the underground cable layout will be completed in a manner that meets affected landowner requirements, minimizes impact to the environment and achieves required economics. (H.E. 6, p17.) Above ground cable vaults measuring 48 inches by 60 inches will be installed where underground cable circuits intersect. The vaults will be installed in a manner to minimize visual impact, avoid interference with intended land use, and ensure the public is protected. Where appropriate, posts will be installed adjacent to the underground cable vaults to minimize damage by farm equipment or vehicles. Cable circuits will be installed underneath public rights-of-way in compliance with road permits received from appropriate public authorities. Placement of collector and feeder lines is addressed in the site permit at III.E.7 and 8. The proposed wind farm is expected to have a minimal effect on the existing infrastructure.

59. The project will require the use of public roads to deliver construction supplies and materials to the work site. Site permit condition III.B.8. addresses this topic. Township road authorities have given their authority to the Freeborn County Highway Engineer to act on their behalf. Wear and tear on roads will occur as a result of the transport of heavy equipment and other materials. The site permit at III.B.8, addresses road damages. Construction of the project requires the addition of access roads that will be located on private property. The access roads will be routed along the wind turbine strings, fence lines, and field edges to minimize disturbance to agricultural activities. The typical access road will be 15 to 20 feet in width and covered in Class 5 gravel (or similar material). The access roads will be low profile roads to allow for the movement of

agricultural equipment. The site permit at III.B. 8 (b) addresses this topic. During operation and maintenance of the wind plant, operation and maintenance crews, while inspecting and servicing the wind turbines, will use access roads. Periodic grading and maintenance activities will be used to maintain road integrity. The Permittee may do this work or contract it out.

60. If access roads are installed across streams or drainage ways, the Permittee in consultation with the Minnesota Department of Natural Resources will design, shape and locate the road so as not to alter the original water flow or drainage patterns. Any work required below the ordinary high water line, such as road crossings or culvert installation, will require a permit from the Minnesota Department of Natural Resources. See site permit at III.K.7.
61. The proposed wind farm will not affect water supplies, railroads, telecommunication facilities, and radio reception. The presence or operation of the wind plant could potentially impact the quality of television reception in the area. Previous work on television reception issues indicates that in some cases new antennas or relocation of existing antennas can restore television signal strength reception. The Permittee will address the concerns of residents in the area of the project site before and after project construction to document and mitigate any television reception impacts that might occur. This is addressed in the site permit at III.D.3.
62. Construction, operation, and maintenance of the proposed wind plant will comply with all of the required federal and state permit requirements. See site permit at III.K.7.

Community Benefits

63. The Bent Tree Wind Project Phase I and Phase II will pay a Wind Energy Production Tax to the county and townships of several hundred thousand dollars per year. Landowners with turbine(s) and/or wind easements on their property will also receive payments from the Permittee.
64. To the extent that local workers and local contractors are capable, qualified, and available, WPL will seek to hire them to construct the proposed project. The hiring of local people will expand employment opportunities in this area of the state and keep money in the local economy. Once constructed, the project will be staffed with several site technicians and a wind plant supervisor.

Effects on Land-Based Economies

65. The wind turbines and access roads will be located so that the most productive farmland will be left as intact as possible. However, each project phase will displace approximately 180 acres of agricultural land. The site permit at III.B. 2., 3., 4., 5., 6., 7., 8(c), 9., and 10. addresses mitigation measures for agricultural lands. The proposed project does not adversely affect any sand or gravel operations.

Archaeological and Historical Resources

66. A review of the Minnesota State Historic Preservation Office (SHPO) computer database review indicates that five structures of historic significance and six archaeological sites are present within the Project Area. The historical structures are located near the town of Manchester and also scattered across Bath, Hartland and Manchester townships. The proposed turbine layout will not directly impact these facilities or sites. The National Register of Historic Places indicated the presence of eight listings for Freeborn County in the cities of Albert Lea, Clarks Grove, and Hayward. However the registered sites are not located in or near the Project Area.
67. An archaeology survey is recommended for all the proposed turbine locations, access roads, junction boxes and areas of construction impact for the transmission line to document any previously unrecorded archaeological sites within the project site. The site permit at III. D.2. requires the Permittee to conduct an archaeological reconnaissance survey (Phase I) archaeology survey consists of the following tasks: consultation, documentation, and identification. A Phase I survey provides enough information to allow consideration of avoidance if a site is to be impacted by an undertaking and to gather enough information to allow for reasonable recommendations for more detailed work should it be necessary.
68. If any archaeological sites are found during the Phase I survey, their integrity and significance should be addressed in terms of the site's potential eligibility for placement on the National Register of Historic Places (NRHP). If such sites are found to be eligible for the NRHP, appropriate mitigative measures will need to be developed in consultation with the Minnesota State Historic Preservation Officer (SHPO), the State Archaeologist, and consulting American Indian communities. The site permit (III.D.2.) also requires the Permittee to stop work and notify the Minnesota Historical Society and Commission if any unrecorded cultural resources are found during construction.

Air and Water Emissions

69. No harmful air or water emissions are expected from the construction and operation of the LWECS.

Animals and Wildlife

70. With proper planning neither construction nor operation of the Project is expected to have a significant impact on wildlife. Based on studies of existing wind power projects in the United States and Europe, the only impact of concern to wildlife would primarily be to avian and bat populations. The final report on avian monitoring studies at Buffalo Ridge, Minnesota "Final Report-Avian Monitoring Studies at the Buffalo Ridge, Minnesota Resource Area: Results of a 4-Year Study" (September 2000) identified the following impacts:

- 70a. Following construction of the wind turbines, there is a reduction in the use of the area within 100 meters of the turbines by seven of 22 species of grassland breeding birds. It was hypothesized that lower avian use may be associated with avoidance of turbine noise, maintenance activities, and less available habitat. The researchers stated “on a large scale basis, reduced use by birds associated with wind power development appears to be relatively minor and would not likely have any population consequences on a regional level.” (p. 44)
- 70b. Avian mortality appears to be low on Buffalo Ridge, compared to other wind facilities in the United States, and is primarily related to nocturnal migrants. Resident bird mortality is very low and involves common species. The researchers stated that “based on the estimated number of birds that migrate through Buffalo Ridge each year, the number of wind plant related avian fatalities at Buffalo Ridge is likely inconsequential from a population standpoint.” (p. iv)
- 70c. Bat mortality was also studied at Buffalo Ridge, instigated by bat collision victims found during the avian monitoring studies. The bat study was conducted in 2001 and 2002. (“Bat Interactions with Wind Turbines at the Buffalo Ridge, Minnesota Wind Resource Area,” November 2003). The overall conclusion is that bat activity at turbines and the numbers of bat fatalities do not share a statistical relationship. Bat collisions were found to be very rare, given the amount of bat activity documented at the turbines. Most fatalities involved migrating or dispersing bats occur in the fall. Fatality estimates at Buffalo Ridge indicate that the population of bats susceptible to turbine collisions is large, and that the observed number of fatalities “is possibly not sufficient to cause significant, large-scale population declines.” (p. 6-1)
71. Mitigation measures are prescribed in the site permit and include but are not limited to: a) a pre-construction inventory of existing biological resources, native prairie, state listed and threatened species and wetlands in the project area (Site Permit III.D.1); b) turbines and associated facilities will not be constructed in wildlife management areas, recreation and state scientific and natural areas or parks (Site Permit III.C.4) and a 5 by 3 rotor diameter setback is provided (Site Permit III.C1). In its permit application (HE 6, pages 49-54), WPL outlined practices it will take to implement and minimize impacts to federal and state-listed species and rare or sensitive habitat in the Project Area during micro-siting of the turbines and access roads and the subsequent development and operation of the Project. The site permit has requirements to implement sound water and soil conservation practices during construction and operation of the project throughout the Project’s life in order to protect topsoil and adjacent resources and to minimize soil erosion (Site Permit III.B.9). This also applies to any work in proximity to watercourses (Site Permit III.C.5).
72. On June 29, 2009, the DNR submitted a letter to the ALJ recommending a two year post construction mortality study using DNR Protocols to monitor bird and bat mortality at Large Wind Energy Conversion Systems. (HE 2). However, DNR provided no reasons or

basis as to the need for such a study using its recommended protocols. Therefore, OES is not recommending implementation of any study requirements until PUC and OES staff and DNR staff determine what types of studies may necessary or appropriate.

Vegetation

73. No public waters, wetlands or forested land are expected to be adversely affected by the project. No groves of trees or shelterbelts will need to be removed to construct and operate the system. Native prairie will also be avoided. If native prairie cannot be avoided, the site permit, at III. C.6., provides for preparation of a prairie protection and management plan.

Soils

74. Construction of the wind turbines and access roads in farmland increases the potential for erosion during construction. The site permit at III. B. 9. requires a soil erosion and sediment control plan. The project will also require a storm water run-off permit from the Minnesota Pollution Control Agency.

Surface Water and Wetlands

75. Access roads or utility lines will not be located in surface water or wetlands, unless authorized by the appropriate permitting agency. See site permit at III.C.5.

Future Development and Expansion

76. Current information suggests windy areas in this part of the state are large enough to accommodate more wind facilities. In the future, wind turbines used in Freeborn and surrounding counties will consist of several types and sizes supplied by different vendors and installed at different times.
77. While large-scale projects have occurred elsewhere (Texas, Iowa and California), little systematic study of the cumulative impact has occurred. Research on the total impact of many different projects in one area has not occurred. OES EFP staff will continue to monitor for impacts and issues related to wind energy development.
78. The Commission anticipates more site permit applications under Minnesota Statutes section 216F.04 (a). The Commission is responsible for siting of LWECS “in an orderly manner compatible with environmental preservation, sustainable development, and the efficient use of resources.” Minnesota Statutes section 216F.03.
79. Minnesota Statutes section 216E.03, subd. 7 requires consideration of design options that might minimize adverse environmental impacts. By using larger turbines, fewer turbines are required, reducing siting needs for turbines and related facilities. Turbines must also be designed to minimize noise and aesthetic impacts. Buffers between strings of turbines

are designed to protect the turbines' production potential. The site permit also provides for buffers between adjacent wind generation projects to protect production potential. See site permit at III.C.1.

80. The location and spacing of the turbines are critical to the issues of orderly development and the efficient use of wind resources. Turbines are likely to be located in the best winds, and the spacing dictates, among other factors, how much land area the project occupies. There is strong public support for orderly development.
81. One efficiency issue is the loss of wind in the wake of turbines. When wind is converted to rotational energy by the blades of a wind turbine, energy is extracted from the wind. Consequently, the wind flow behind the turbine is not as fast and is more turbulent than the free-flowing wind. This condition persists for some distance behind the turbine as normal wind flow is gradually restored. If a turbine is spaced too close downwind of another, it produces less energy and is less cost-effective. This is the wake loss effect. If the spacing is too far, wind resources are wasted and the projects' footprint on the land is unnecessarily large.
82. For this project, turbine spacing maximizes use of the available wind resources and minimizes wake and array losses within the topographical context of the site. Site topography, natural resource features and wind resources did lead to a layout involving long strips of turbines running parallel to each other and perpendicular to the prevailing wind. In some places, it is expected that the site will use shorter strings or clusters of and possibly isolated turbines locations within the site. The objective is to capture the most net energy possible from the best available wind resource. Allowing for setbacks from roads and residences and avoiding sensitive areas, Wisconsin Power and Light Company arrived at a nominal turbine spacing of 3 rotor diameters in the non-prevailing wind directions and five or more rotor diameters in the prevailing wind directions, northwest-southerly direction, with respect to the predominant energy production directions. Given the prevalence for southerly winds, the spacing between turbines will be greater in the prevailing winds in the northwest-southerly direction for the Bent Tree Wind Project. WPL does not expect significant wake loss.
83. Other factors that lead to energy production discounts include turbine availability, blade soiling, icing, high wind hysteresis, cold weather shutdown, electrical efficiency and parasitic. Total losses typically range from 13 to 16 percent.

Maintenance

84. Maintenance of the turbines will be on a scheduled, rotating basis with one or more units normally off for maintenance each day, if necessary. Maintenance on the interconnection points will be scheduled for low wind periods. The Bent Tree Wind Project will be staffed with several wind technicians and a wind plant supervisor. An operations and maintenance facility will also be built near Hartland. The operation and maintenance facility will be permitted by the local unit of government.

Decommissioning and Restoration

85. WPL expects that the life of the Project will be no less than 25 years and reserves the right to re-apply for a LWECS site permit and continue operation of the Project. LWECS site permit renewal may be under a new long-term power purchase agreement (PPA), merchant operation of the Project, or replacement and re-powering of the Project. (HE 6, pages 22-23).
86. Decommissioning activities will include (1) removal of all wind turbine components and towers; (2) removal of all pad mounted transformers; (3) removal of all above-ground distribution facilities; (4) removal of foundations; and (5) removal of surface road material and restoration of the roads and turbine sites to previous conditions to the extent feasible. (HE 6, pages 22-23). The Permit (III.G.1.) requires the Permittee to submit a Decommissioning Plan to the PUC prior to commercial operation. The Permit (III.G.2.) addresses site restoration and paragraph (III.G.3.) addresses turbines abandoned prior to termination of operation of the LWECS.

Site Permit Conditions

87. All of the above findings pertain to the Applicant's requested permit for a 400 megawatt wind project.
88. Most of the conditions contained in this site permit were established as part of the site permit proceedings of other wind turbine projects permitted by the Environmental Quality Board and the Public Utilities Commission. Comments received by the Commission have been considered in development of the site permit. Minor changes and additions that provide for clarifications of the draft site permit conditions have been made.
89. The site permit contains conditions that apply to site preparation, construction, cleanup, restoration, operation, maintenance, abandonment, decommissioning and all other aspects of the Project.

Based on the foregoing findings, the Minnesota Public Utilities Commission makes the following:

CONCLUSIONS OF LAW

1. Any of the foregoing findings which more properly should be designated as conclusions are hereby adopted as such.
2. The Minnesota Public Utilities Commission has jurisdiction under Minnesota Statute 216F.04 over the site permit applied for by Wisconsin Power and Light Company for the 400 megawatt Bent Tree Wind Project.

3. The Wisconsin Power and Light Company application for a site permit was properly filed and noticed as required by Minnesota Statutes 216F.04 and Minnesota Rules 7854.0600 subp 2 and 7854.0900 subp 2.
4. The Minnesota Public Utilities Commission has afforded all interested persons an opportunity to participate in the development of the site permit and has complied with all applicable procedural requirements of Minnesota Statutes Chapter 216F and Minnesota Rules Chapter 7854.
5. A request for a contested case hearing was filed prior to the close of the comment period. The request for a contested case has been addressed by the Commission in a separate action from the site permit decision.
6. The Minnesota Public Utilities Commission is the agency directed to carry out the legislative mandate to site LWECS in an orderly manner compatible with environmental preservation, sustainable development and the efficient use of resources. The proposed 400 megawatt LWECS Bent Tree Wind Project will not create significant human or environmental impacts and is compatible with environmental preservation, sustainable development, and the efficient use of resources.
7. The Minnesota Public Utilities Commission has the authority under Minnesota Statutes section 216F.04 to establish conditions in site permits relating to site layout, construction and operation and maintenance of an LWECS. The conditions contained in the site permit issued to Wisconsin Power and Light Company for the Bent Tree Wind Project are appropriate and necessary and within the Minnesota Public Utilities Commission's authority.
8. In accordance with Minnesota Rule 7854.0500 Subp.2., a site permit may not be issued until the certificate of need or other commitment requirement has been satisfied.

Based on the foregoing Findings of Fact and Conclusions of Law, the Minnesota Public Utilities Commission issues the following:

ORDER

A LWECS Site Permit is hereby issued to Wisconsin Power and Light Company, to construct and operate the 201.3 megawatt Bent Tree Wind Project Phase I in Freeborn County in accordance with the conditions contained in the site permit and in compliance with the requirements of Minnesota Statute 216F.04 and Minnesota Rules Chapter 7854 for PUC Docket No. ET-6657/WS-08-573.

The Commission withholds issuance of a LWECS Site Permit for the Bent Tree Wind Project Phase II until such time as Wisconsin Power and Light Company or the entity purchasing the energy or owning the facility can satisfy the requirements of Minnesota Statutes 216B.243, subd 2 and Minnesota Rules 7849. Upon satisfying those requirements the Commission will reconsider LWECS Site Permit Issuance for the Bent Tree Wind Project Phase II.

The site permit is attached hereto, with a map showing the approved site.

BY THE ORDER OF THE COMMISSION

Burl W. Haar
Executive Secretary

(S E A L)

This document can be made available in alternative formats (i.e., large print or audio tape) by calling 651.297.4596 (Voice). Persons with hearing or speech disabilities may call us through Minnesota Relay at 1.800.627.3529 or by dialing 711.